

CLAIMS

1. Device comprising:

- a support having a surface comprising an
5 attachment zone (Z) capable of being functionalized
with a probe (A) capable of binding to a target (B) so
as to attach it;

- a working electrode (WE) and a
counterelectrode (CE) for this working electrode,
10 placed on the support in the vicinity of the attachment
zone, in which the working electrode borders or
surrounds the attachment zone;

- means for applying a given electric current
or a given potential to said working electrode so as to
15 cause, when said attachment zone and said electrodes
are immersed in an aqueous solution, a local variation
in pH in the region of said attachment zone.

2. Device according to Claim 1, in which the
20 working electrode borders or surrounds the attachment
zone, and the counterelectrode borders or surrounds
said working electrode.

3. Device according to Claim 1, in which the
25 working electrode, the counterelectrode and the
attachment zone are in a design chosen from the group
consisting of an interdigitated comb design, a spiral
design and a concentric design.

30 4. Device according to Claim 1, in which the
means for applying a given electric current or a given

potential to said working electrode are means for applying one or more given current or potential train(s) for one or more given period(s) of time.

5 5. Device according to Claim 1, also comprising a reference electrode placed so as to be able to measure the potential applied to the working electrode.

10 6. Device according to Claim 1, in which the attachment zone is in the form of an electrode.

15 7. Device according to Claim 1, in which the attachment zone is functionalized with the probe (A) capable of binding, according to the pH, to the target (B) so as to attach it.

20 8. Device according to Claim 7, in which the probe is such that it is capable of binding to the target so as to attach it by means of an electrophilic or nucleophilic group.

25 9. Device according to Claim 7, in which the probe is such that it is capable of binding to the target so as to attach it by means of an electrophilic group chosen from the group consisting of aldehyde, halide, thiocyanate, isocyanate, activated ester, carbamate and epoxide functions.

30 10. Device according to Claim 7, in which the probe is such that it is capable of binding to the

target so as to attach it by means of a nucleophilic group chosen from the group consisting of amine, alkoxide, phenol, phenate, oxyamine and hydrazine functions.

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11. Device according to Claim 7, in which the probe is chosen such that it can form, in the working solution, with the target molecule so as to attach it, a bond chosen from the group consisting of a hydrogen, 10 peptide, amide, sulphonamide, carboxylic acid ester, sulphonic acid ester or substituted silanoate bond.

12. Device according to Claim 7, in which the attachment zone is functionalized with a probe chosen 15 from the group consisting of an oligonucleotide, a protein, an enzyme, an enzyme substrate, a hormone receptor, a hormone, an antibody, an antigen, a eukaryotic or prokaryotic cell or fragments of such cells, an alga or a microscopic fungus.

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13. Electrochemical microsystem, characterized in that it comprises one or more device(s) according to any one of Claims 1 to 12.

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14. Use of a device according to any one of Claims 1 to 12, in a method intended to purify, concentrate, screen or detect a target or an object.

15. Method for attaching a target (B) present 30 in an aqueous sample to a probe (A), said method comprising the following steps:

5 a) bringing the aqueous sample into contact with the attachment zone of a device according to Claim 1, functionalized with the probe (A) capable of binding, according to the pH, to the target (B) so as to attach it;

10 b) applying an electric current or a potential to the working electrode of said device so as to locally modify, in the region of said attachment zone, the pH of the aqueous sample such that the probe recognizes and binds specifically to the target so as to attach it.

15 16. Method for attaching and detaching a target (B) present in an aqueous sample to and from a probe (A), said method comprising the following steps:

20 a') bringing the aqueous sample comprising the target (B) into contact with the attachment zone of a device according to Claim 1, functionalized with the probe (A), such that the target (B) attaches to said probe;

25 b') applying an electric current or potential to the working electrode of said device so as to locally modify, in the region of said attachment zone, the pH of the working solution such that the target (B) detaches from the probe (A).

30 17. Method according to Claim 16, in which the attachment of the target by the probe in step a') is carried out by applying an electric current or a potential to the working electrode of said device so as to locally modify, in the region of said attachment

zone, the pH of the working solution such that the target (B) attaches to said probe (A).

18. Method according to Claim 15 or 16, also
5 comprising the following step, before or after the attachment of the target by the probe:

(x) attachment of an object to the target.

19. Method according to Claim 18, in which the
10 object is chosen from the group consisting of a molecule, a cell; a bacterium; functionalized beads; a protein; an oligonucleotide; an enzyme; an antibody; a biological fragment; molecules to be transfected; molecules of biological interest; active principles; 15 molecules of pharmacological interest.

20. Method according to Claim 18, in which the object is a label for detecting the target, said method also comprising a step consisting in detecting the 20 labelled target.

21. Method according to Claim 15 or 16, in which the sample comprising the target is in the form of a buffered aqueous solution.

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22. Method according to Claim 15 or 16, in which the target and the probe are oligonucleotides complementary to one another.

23. Method according to Claim 20, in which the probe carries a biotin, and the target is labelled with streptavidin-phycoerythrin.

5 24. Method according to Claim 15 or 16, in which said device is a device according to any one of Claims 7 to 13.

10 25. Use of a method according to any one of Claims 15 to 23, in a method intended for extracting, concentrating, screening or detecting a target or an object.

15 26. Use according to Claim 25, in which the target or the object is chosen from the group consisting of an oligonucleotide, a protein, an enzyme, an enzyme substrate, a hormone receptor, a hormone, an antibody, an antigen, a eukaryotic or prokaryotic cell or fragments of such cells, an alga or a microscopic 20 fungus.